APPENDIX F

SPECIALIST REPORTS

APPENDIX F1: Aquatic Ecology Impact Assessment

Mossdustria Expansion on Erf 6 and Remainder of Portion 8 of the Farm Rietvalley 225, near Mossel Bay

WETLAND / AQUATIC ASSESSMENT

BY

EnviroSci (Pty) Ltd
Dr Brian Colloty
1 Rossini Rd
Pari Park
Gqeberha
6070

DATE
24 June 2026

REVISION 1

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SPECIALIST REPORT DETAILS

Report prepared by: Dr. Brian Colloty Pr.Sci.Nat. (Ecology 400268/07) / Member SAEIES.

Expertise / Field of Study: BSc (Hons) Zoology, MSc Botany (Rivers), Ph.D Botany Conservation Importance rating, and has worked as an independent consulting specialist from 1996 to present.

I, **Dr. Brian Michael Colloty** declare that this report has been prepared independently of any influence or prejudice as may be specified by the National Department of Environmental Affairs, Fisheries and Forestry, and or Department of Water and Sanitation

Signed:… …………………………………………… Date:…24 June 2026…………

DECLARATION OF THE SPECIALIST

Note: Duplicate this section where there is more than one specialist.

I ………Brian Colloty……………………………, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

Signature of the EAP: Date: 24 June 2026

EnviroSci (Pty) Ltd

Name of company (if applicable):

1 Introduction

Nemai Consulting (Pty) Ltd appointed EnviroSci (Pty) Ltd on behalf of Mossel Bay Local Municipality (MBLM), to undertake an aquatic ecological impact assessment for the proposed Mossdustria Expansion, on Remainder of Portion 8 of the Farm Rietvalley 225, near Mossel Bay, Western Cape. Mossdustria is an industrial area located adjacent to, and to the east of the Petroleum Oil & Gas Corporation of South Africa (PetroSA) Refinery, on the outskirts of Mossel Bay. The site falls under the jurisdiction of the MBLM and is located about 14 km west of Mossel Bay, along the N2 (Figure 1).

The PROTOCOL FOR SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR THE ENVIRONMENTAL IMPACTS ON BIODIVERSITY (Government Gazette 43110, 20 March 2020), superseding the Appendix 6 NEMA requirements, was also adhered to. This report thus meets the criteria to fulfil a Specialist Verification Assessment Report as the proposed site is located within an area rated as ***Very High***, sensitivity by the DFFE Screening Tool results addressed in this report, summarised as follows:

- CBA – Wetland
- ESA 1 – Aquatic
- Wetlands _ Channelled valley bottom
- Wetlands _ Depressions
- Wetlands _ Seep
- FEPA Subcatchment

The area is therefore characterised by a high lying coastal plateaus, showing varying degrees of transformation. Where any freshwater systems were evident, then the criteria contained in the DWAF 2005 / 2008 delineation manuals and the Wetland/Riverine Classification System were used. Site-specific surveys were thus conducted based on two site visits conducted in 11-13 April 2022 and a follow-up visit in October 18 -19 2022 (early Spring) and 16 May 2025 (Autumn). With a focus on post rain periods as this region falls within the Winter /Bimodal rainfall transition area, i.e. highest rainfall expected in winter but with occasional rain in summer as well.

This assessment was required as the proposed development is located within the regulated area of wetlands and rivers, thus requiring Section 21 c & i water use authorisations by the Department of Water and Sanitation.

1.1 Location & Project description

The project entails the extension of Mossdustria and a raceway on the Remainder Portion 8 of Farm Rietvalley 225 (+/- 90 ha). The extension will include the following:

- Industrial development with associated infrastructure (+/- 12 ha);
- Alternative Energy Production Area (+/- 22 ha);
- Conservation area (+/- 15 ha); and
- Motorsport arena including tracks, parking, ablution facilities, training facilities, fuel storage (5 000 litres), 80 workshops, pavilions and associated infrastructure (+/- 38 ha).

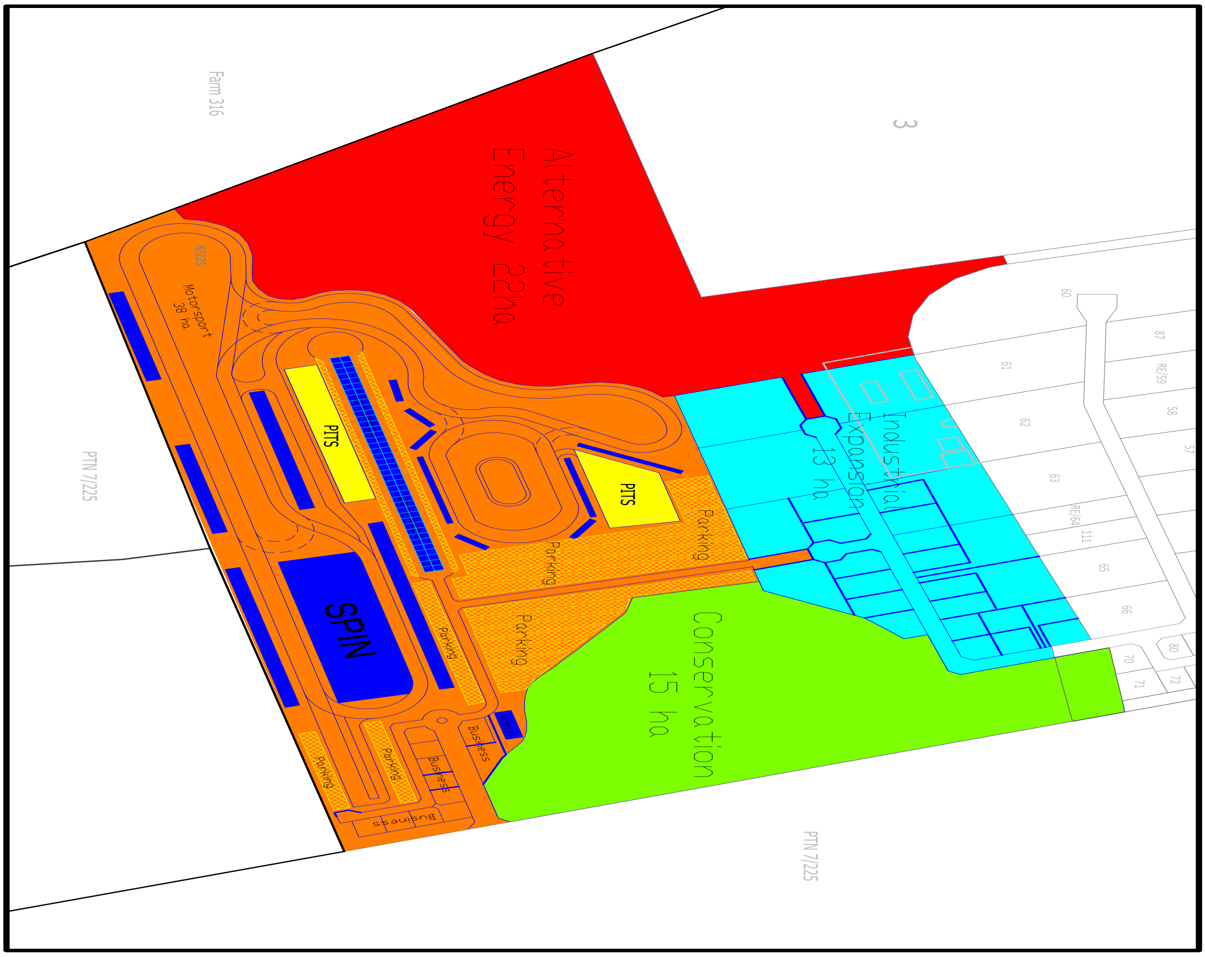

Figure 1: Proposed project layout within the study area

1.2 Relevant legislation and policy

The following is pertinent to this study:

- Section 24 of The Constitution of the Republic of South Africa;
- Agenda 21 – Action plan for sustainable development of the Department of Environmental Affairs and Tourism (DEAT) 1998;
- National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), inclusive of all amendments, as well as the NEM: Biodiversity Act;
- National Water Act, 1998 (Act No. 36 of 1998);
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);
- Nature and Environmental Conservation Ordinance (No. 19 of 1974);
- National Forest Act (No. 84 of 1998); and
- National Heritage Resources Act (No. 25 of 1999).

2 Terms of Reference

Based on the request by the client, the Wetland / Aquatic Assessment Report contains the following (minimum):

- Delineate the wetlands within 500m of the site according to relevant DWS guidelines. Provide the required watercourse buffers.
- Determine the ecological status of the receiving aquatic environment, including the identification of endangered or protected species. Determine the PES and REC of affected watercourses.
- Provide a concise description of the importance of the affected wetlands in terms of pattern and process, ecosystem goods and services, as appropriate.
- Identify potential impacts of the project on the wetland environment and suggest suitable mitigation measures to address the identified impacts.
- The report must include the appropriate mapping.
- Prepare a sensitivity map (GIS-based), based on the findings of the study. All SHP files must be provided by the Specialist.

3 Knowledge Gaps

To obtain a comprehensive understanding of the dynamics of both the flora and fauna of communities within a study site, as well as the status of endemic, rare, or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints, these long-term studies are not always feasible and are thus mostly based on instantaneous sampling. This limitation is common to many impact assessment-type studies, but the findings are deemed adequate for the purposes of decision-making support regarding project acceptability, unless otherwise stated.

Therefore, due to the scope of the work presented in this report, a long-term investigation of the proposed site was not possible and, as such, not perceived as part of the Terms of Reference. However, a concerted effort was made to assess as much of the potential site as well as make use of any available literature, species distribution data, and aerial photography.

It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

4 Study Area

4.1 Climate

The site is located within the bimodal rainfall region of South Africa, with a Mean Annual Precipitation (MAP) for the coastal region at ca. 680 mm per annum. Annual average temperatures range between 7.6 and 25° C, with frost a rare occurrence of no more than 3 days per year (Mucina & Rutherford, 2007).

4.2 Geology and soils

The site is underlain with soils associated with sandstone and shale of the Ceres subgroup and Quarzitic sandstones and shales of the Nardouw Subgroup (Council of Geoscience, 2020).

4.3 Slope and aspect

The region is characterised by the higher-lying coastal plateaux between the Mossel Bay and Gourits river valley and located, between 166 and 175 m ASL (Above Sea Level).

4.4 Terrestrial environment

The sites spans two vegetation units as defined by the National Vegetation Map (revised 2025), and includes the following (Figure 2), noting that the majority of these areas or units are already disturbed, i.e., pipelines, servitudes, roads, and residential areas:

- Hartenbos Dune Thicket
- Northern Langeberg Sandstone Fynbos

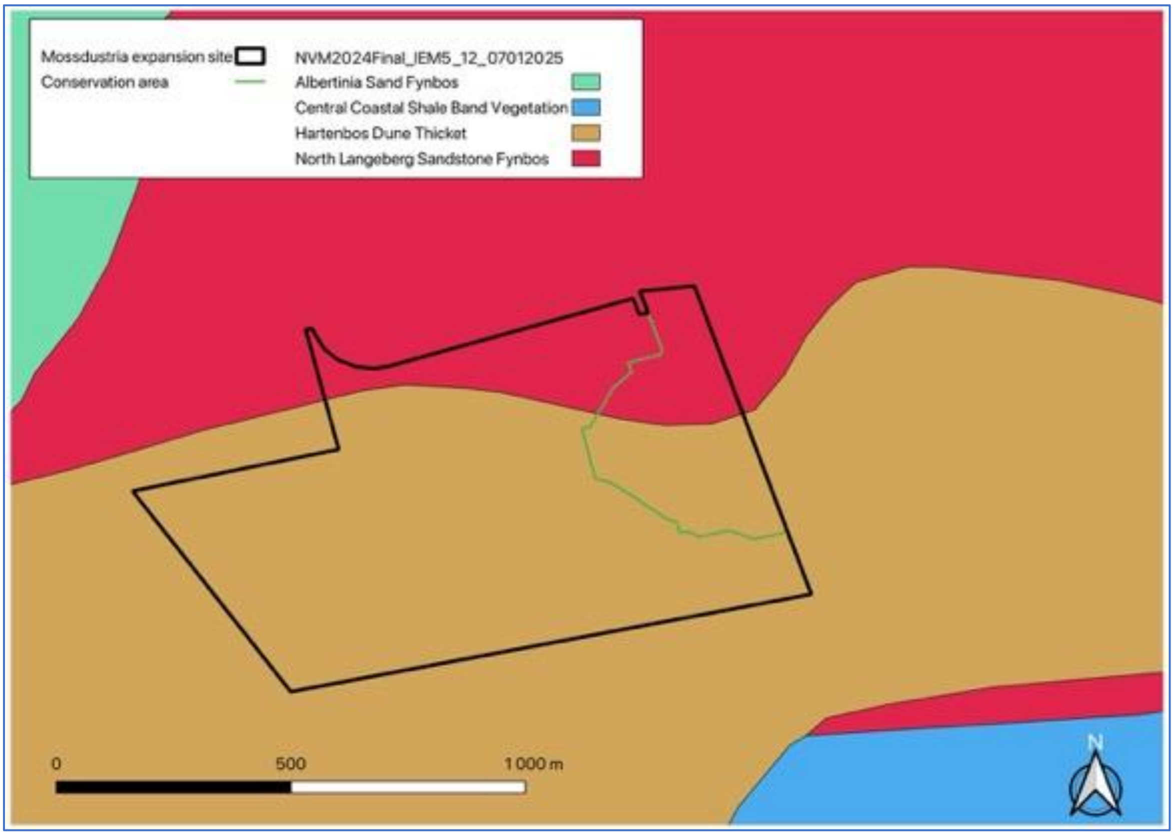

Figure 2: Vegetation South Africa VegMap as per Mucina & Rutherford (2007) revised 2024

4.5 Drainage network

The study site is located within the Southern Coastal Belt Ecoregion, within the K10A Subquaternary Catchment (Figure 2), located within the Breede Olifants Gouritz Catchment Management Agency (George Office). Therefore, anticipated waterbodies (rivers and wetlands) would be closely linked to the Nardouw and Ceres geological formations consisting of quarzitic sandstone and minor shales that result in the formation of small plateaus eroded by small to medium sized rivers. While in areas, where shales are dominant on the higher lying plateaus, pans / depressions were observed. The study area watercourses are associated with a small localised coastal catchment that drains the region in easterly direction, known as the Tweekuilen River, ending near Dias Beach in Mossel Bay (more than 9km away). (Figure 3).

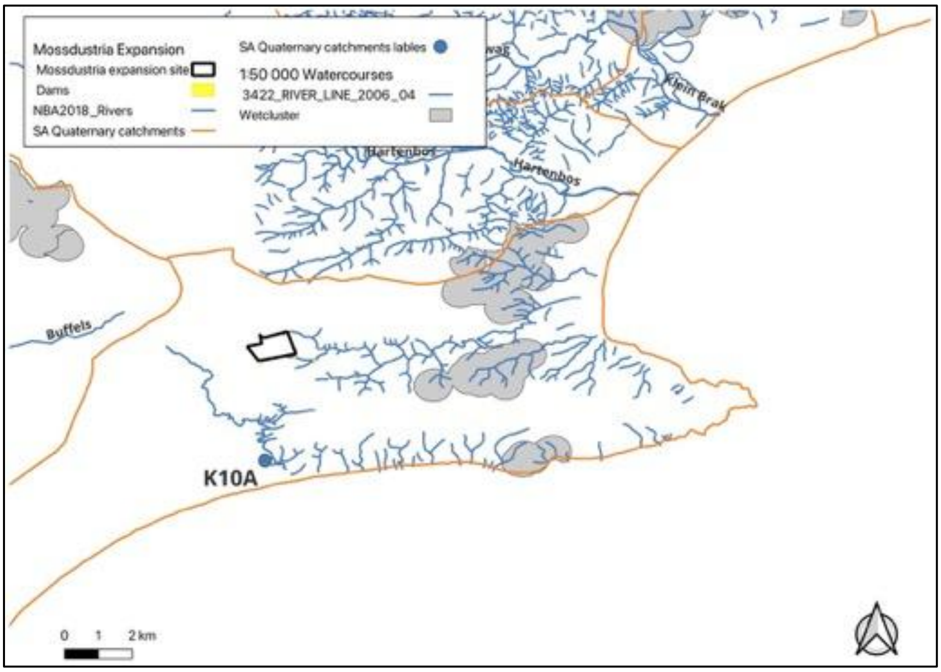

Figure 3: Watercourses and mainstem rivers known within the greater catchments

4.6 South African Inventory of Inland Aquatic Ecosystems

The latest available river and wetland spatial datasets (Van Deventer *et al.* 2018) were used to identify the aquatic features likely to be present on site, on a desktop level, prior to groundtruthing and field delineation. The National Rivers Map and South African National Wetland Map are GIS layers produced as part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) during the National Biodiversity Assessment (SANBI 2018). Figure 4 shows the project site in relation to the above-mentioned wetland and river inventories. It should also be noted that the Wetland Inventory, did not indicate the two stormwater channels, that are colonised by Phragmites reeds, as these are artificially created.

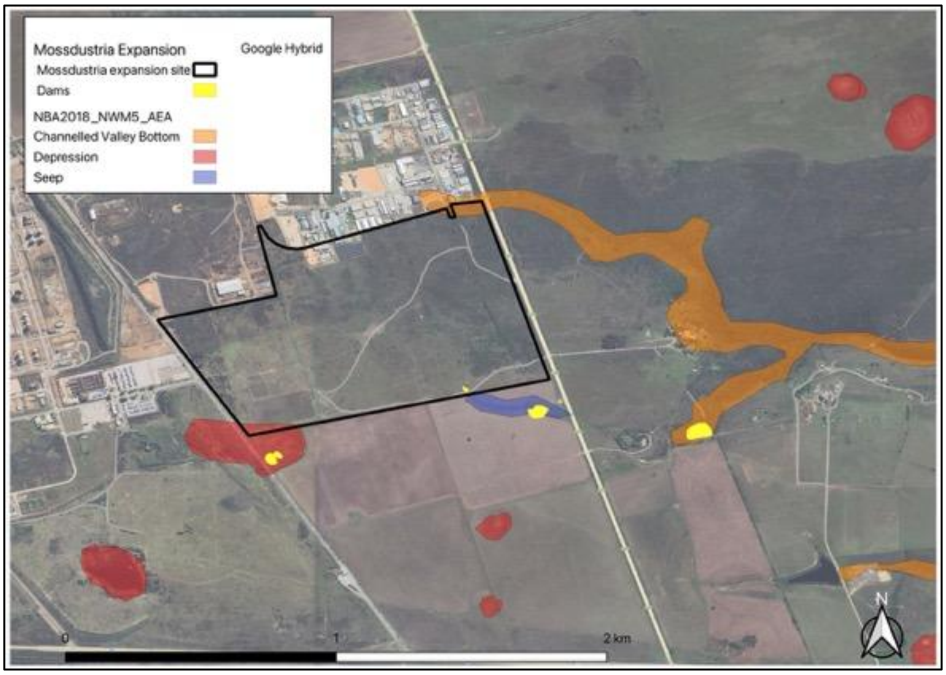

Figure 4: Potential wetland as identified in the National Wetland Inventory (v5) van Deventer *et al.* 2018)

4.7 Conservation context

The study area is included in the National Freshwater Ecosystems Priority Atlas areas (NFEPA - Nel *et al*., 2011, but is not located within a Strategic Water Resource Area or a NFEPA Wetland Cluster (Figure 5). The site is NFEPA (SQ9292) due to the importance of various fish associated with the downstream estuaries and rivers within the catchment. Thus, for this reason, the aquatic systems surrounding the site were identified in the Western Caper Biodiversity Spatial Plan (2023) (Figure 6), as Aquatic Critical Biodiversity Areas (CBA Type 1 Rivers & Wetland), Aquatic Critical Biodiversity Areas (CBA Type 2 Aquatic), and Ecological Support Areas (ESA Type 1 and Type 2), that could be affected. However, it was confirmed that all of the site and associated infrastructure would be located within areas due to past development, and have been excluded from these aquatic CBA & ESAs.

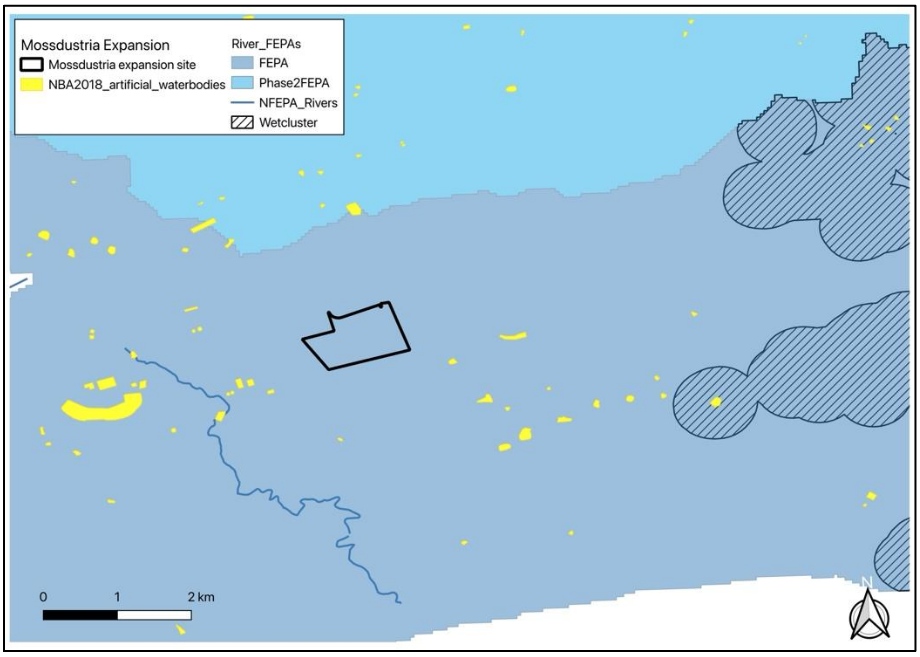

Figure 5: The study area in relation to NFEPA catchments, dams and NFEPA Wetland Clusters

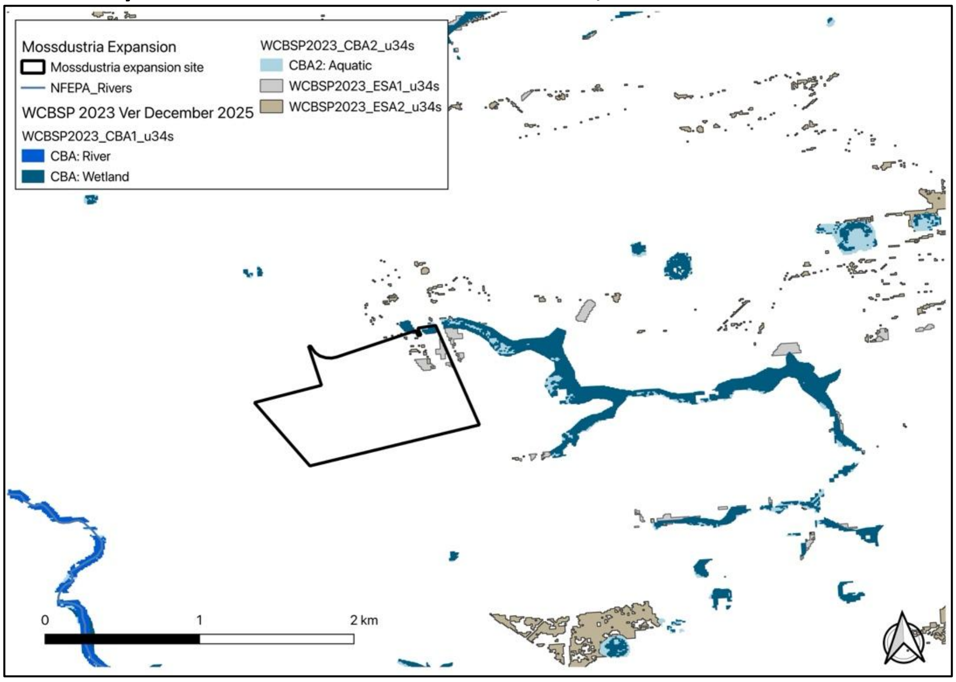

Figure 6: Results of the WCBSP 2023, Updated December 2025) for the Aquatic Environment, where the proposed can avoid any CBA/ESAs

5 Site Sensitivity Verification

Government Notice No. 645, dated 10 May 2019, includes the requirement that an Initial Site Sensitivity Verification Report must be produced for a development footprint. As per Part 1, Section 2.3, the outcome of the Initial Site Verification must be recorded in the form of a report that-

(a) Confirms or disputes the current use of the land and environmental sensitivity as identified by the national web-based environmental screening tool;
(b) Contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity;
(c) Is submitted together with the relevant reports prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

This report has been produced specifically to consider the aquatic ecology theme and addresses the content requirements of (a) and (b) above. The report will be appended to the respective specialist study included in the Scoping and EIA Reports produced for the projects.

<u>Site sensitivity based on the biodiversity theme included in the Screening Tool and specialist assessment</u>

Based on the DFFE Screening Tool, the site contains areas of Very High sensitivity due to the presence of the following (Figure 7).

- CBA – Wetland
- ESA 1 – Aquatic
- Wetlands _ Channelled valley bottom
- Wetlands _ Depressions
- Wetlands _ Seep
- FEPA Subcatchment

Figure 7: DFFE Screening Tool outcome for the aquatic biodiversity theme, = Very High

Based on the above outcomes, the specialist refutes the environmental sensitivities identified for this site. The findings have been informed by site visits undertaken by Dr Brian Colloty, which, based on the field observations, confirm the sensitivity of the observed site and that the proposed development is located in disturbed areas only and won't have any direct effects on adjacent aquatic systems

Motivation of the outcomes of the sensitivity map and key conclusions

In conclusion, the DFFE Screening Tool identified one sensitivity rating within the study area, namely, Very High. However, based on the site-based investigations, the current state of the receiving environment was found to range from a poor or degraded state, or with little to no natural habitat function, thus the proposed footprint will be located within a Moderate / Medium sensitivity area from and aquatic standpoint (See Figure 13). Regardless a detailed / full aquatic assessment was compiled, this report, to meet DWS requirements related to future Water Use License application/s that will be needed.,

6 Expertise of the specialist

Dr Brian Michael Colloty is a SACNASP registered Ecologist & Environmental Assessment Practitioner (Pr. Sci. Nat. 400268/07). He is a member of the South African Wetland Society and specialises in ecology and conservation importance rating of inland habitats, wetlands, rivers & estuaries. Specialist CV is attached in Appendix 1.

Brian has over 30 years of experience in environmental sensitivity and conservation assessment of aquatic and terrestrial systems, including the Index of Habitat Integrity (IHI), WET Tools, Riparian Vegetation Response Assessment Index (VEGRAI) for Reserve Determinations, and estuarine and wetland delineation throughout Africa. He also has 15 years of experience in the coordination and management of multi-disciplinary teams, such as specialist teams for small to large-scale EIAs and environmental monitoring programmes, throughout Africa, and inclusive of marine, coastal, and inland systems.

TERTIARY EDUCATION

- 1994: B Sc Degree (Botany & Zoology) - NMU
- 1995: B Sc Hon (Zoology) - NMU
- 1996: M Sc (Botany - Rivers) - NMU
- 2000: Ph D (Botany – Estuaries & Mangroves) – NMU

7 Aims and objectives

The aim of this report is to provide an assessment of the aquatic habitats and provide suitable mitigation to minimise potential impacts. The potential impacts associated with the development are formally assessed, and where possible, means to avoid these are also provided (i.e., rehabilitation management recommendations based on aquatic considerations). This assessment is based on site visits conducted in April 2022 and a follow-up visit in October 2022 (early Spring) and May 2025 (Autumn).

8 Methodology

This study followed the approaches of several national guidelines with regard to wetland assessment based on the (DWAF 2008/2009) and Ollis *et al*. (2013) were used and are summarised below

These have been modified by the author to provide a relevant mechanism of assessing the present state of the study area aquatic systems, applicable to the specific environment, and, in a clear and objective manner, identify and assess the potential impacts associated with the proposed development site based on information collected within the relevant farm portions. For reference, the following definitions are as follows:

Drainage line: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall, i.e., non-perennial, and riparian vegetation may not be present.

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contain flows for short periods, such as a few hours or days in the case of drainage lines.

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas that are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g., an area where alluvium is periodically deposited by a stream during floods but which is well drained).

Wetland: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin *et al*., 1979).

Water course: as per the National Water Act, means -

(a) a river or spring;

(b) a natural channel in which water flows regularly or intermittently;

(c) a wetland, lake, or dam into which, or from which, water flows; and

(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

8.1 Wetland identification and mapping

Terminology currently strives to characterise a wetland not only on its structure (visible form), but also to relate this to the function and value of any given wetland. The Ramsar Convention definition of a wetland is widely accepted as *"areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres"* (Davis 1994). South Africa is a signatory to the Ramsar Convention, and therefore its extremely broad definition of wetlands has been adopted for the proposed NWCS, with a few modifications. The adapted definition for the NWCS is, therefore, as follows (Ollis *et al*., 2013):

WETLAND: an area of marsh, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed ten metres.

This definition encompasses all ecosystems characterised by the permanent or periodic presence of water other than marine waters deeper than ten metres. The only legislated definition of wetlands in South Africa, however, is contained within the National Water Act (Act No. 36 of 1998) (NWA), where wetlands are defined as *"land which is transitional between terrestrial and aquatic systems, where the water table is usually at, or near the surface, or the land is periodically covered with shallow water and which land in normal circumstances supports, or would support, vegetation adapted to life in saturated soil."* This definition is consistent with more precise working definitions of wetlands and, therefore, includes only a subset of ecosystems encapsulated in the Ramsar definition

Wetlands must therefore have one or more of the following attributes to meet the above definition (DWAF, 2005):

- A high-water table that results in the saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil.
- Wetland or hydromorphic soils that display characteristics resulting from prolonged saturation, i.e., mottling or grey soils
- The presence of, at least occasionally, hydrophilic plants, i.e., hydrophytes (water-loving plants).

8.2 Wetland delineation

Wetland delineation includes the confirmation of the occurrence of a wetland and a determination of the outermost edge of the wetland. The outer boundary of wetlands was identified and delineated according to the Department of Water Affairs wetland delineation manual ‘A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas’ (DWAF, 2005a).

Wetland indicators were used in the field delineation of the wetlands: position in the landscape, vegetation, and soil wetness (determined through soil sampling with a soil auger and examining the degree of mottling). Figure 8 shows the different wetness and soil characteristics in a typical wetland.

Four specific wetland indicators were used in the detailed field delineation of wetlands, which include:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur.
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation.
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

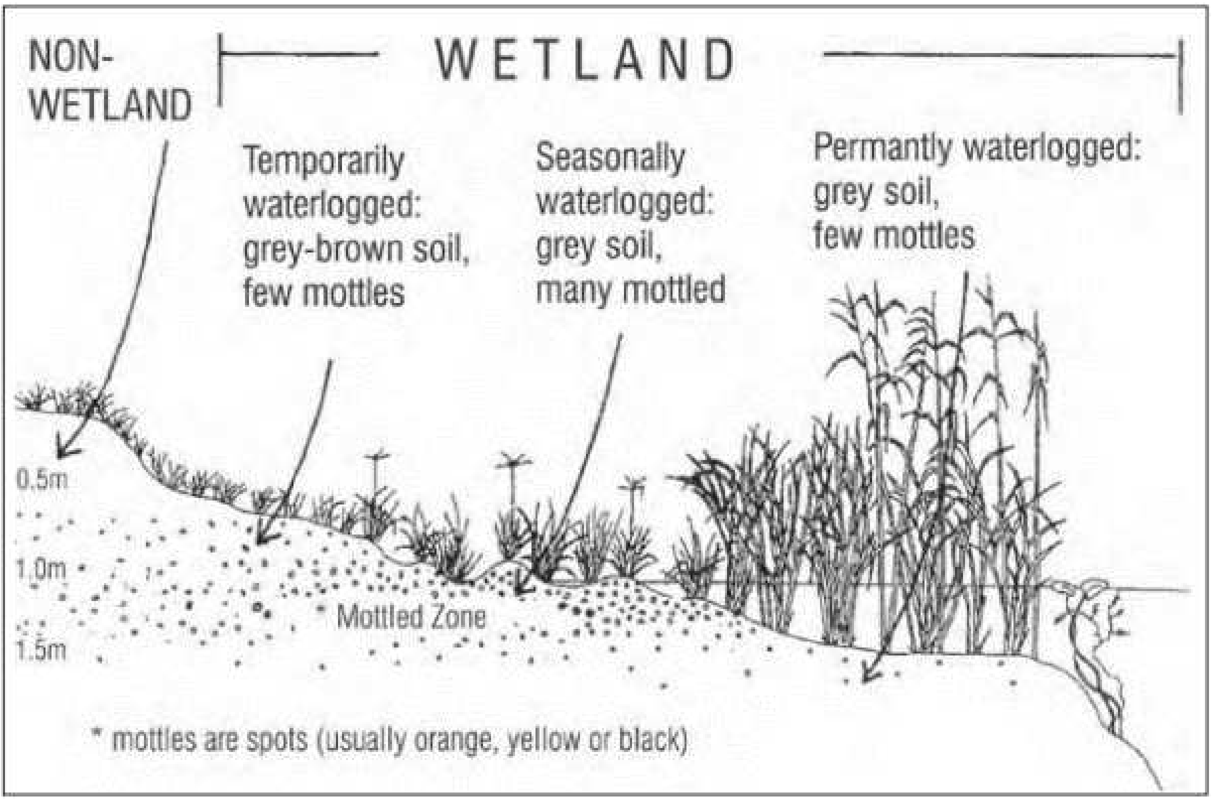

Figure 8: Cross-section through a wetland, indicating how the soil wetness and vegetation indicators change as one move along a gradient of decreasing wetness, from the middle to the edge of the wetland. Source: Donovan Kotze, University of KwaZulu-Natal.

According to the wetland definition used in the National Water Act, vegetation is the primary indicator, which must be present under normal circumstances. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role. The reason is that vegetation responds relatively quickly to changes in soil moisture regime or management and may be transformed, whereas the morphological indicators in the soil are far more permanent and will hold the signs of frequent saturation long after a wetland has been drained (perhaps for several centuries).

8.3 Wetland functional assessment

In order to identify the wetland types, using Kotze *et al.* (2009) and Ollis *et al*. (2013), a characterisation of hydrogeomorphic (HGM) types was conducted. These have been defined based on the geomorphic setting of the wetland in the landscape (e.g., hillslope or valley bottom, whether drainage is open or closed), water source (surface water dominated or sub-surface water dominated), how water flows through the wetland (diffusely or channelled) and how water exits the wetland (Figure 9).

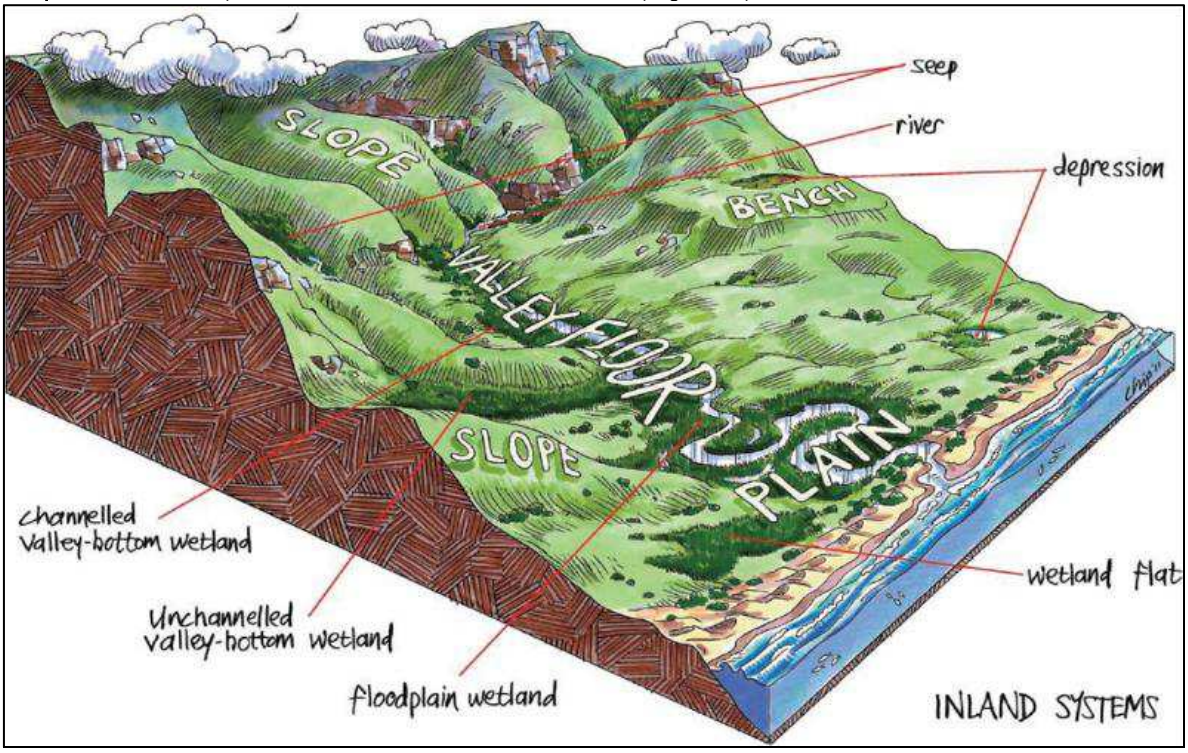

Figure 9: Illustration of wetland types and their typical landscape setting (From Ollie et al. 2013)

The classification system of Ollis *et al*. (2013) uses hydrological and geomorphological traits to distinguish the primary wetland units, i.e., direct factors that influence wetland function. Other wetland assessment techniques, such as the DWAF (2005) delineation method, only infer wetland function based on abiotic and biotic descriptors (size, soils & vegetation) stemming from the Cowardin approach (Ollis *et al.,* 2013). The classification system is summarised below:

There is a six-tiered hierarchical structure, with four spatially nested primary levels of classification (Figures 10 & 11). The hierarchical system firstly distinguishes between Marine, Estuarine, and Inland ecosystems (**Level 1**), based on the degree of connectivity the particular system has with the open ocean (greater than 10 m in depth). Level 2 then categorises the regional wetland setting using a combination of biophysical attributes at the landscape level, which operate at a broad bioregional scale. This is opposed to specific attributes such as soils and vegetation.

Level 2 has adopted the following systems:

- Inshore bioregions (marine)
- Biogeographic zones (estuaries)
- Ecoregions (Inland)

Level 3 of the NWCS assesses the topographical position of inland wetlands, as this factor broadly defines certain hydrological characteristics of the inland systems. Four landscape units based on topographical position are used in distinguishing between Inland systems at this level. No subsystems are recognised for Marine systems, but estuaries are grouped according to their periodicity of connection with the marine environment, as this would affect the biotic characteristics of the estuary.

Level 4 classifies the hydrogeomorphic (HGM) units discussed earlier. The HGM units are defined as follows:

- Landform – shape and localised setting of a wetland
- Hydrological characteristics – nature of water movement into, through, and out of the wetland
- Hydrodynamics – the direction and strength of flow through the wetland

These factors characterise the geomorphological processes within the wetland, such as erosion and deposition, as well as the biogeochemical processes.

Level 5 of the assessment pertains to the classification of the tidal regime within the marine and estuarine environments, while the hydrological and inundation depth classes are determined for inland wetlands. Classes are based on frequency and depth of inundation, which are used to determine the functional unit of the wetlands and are considered secondary discriminators within the NWCS.

Level 6 uses six descriptors to characterise the wetland types based on biophysical features. As with Level 5, these are non-hierarchical in relation to each other and are applied in any order, dependent on the availability of information. The descriptors include:

- Geology;
- Natural vs. Artificial;
- Vegetation cover type;
- Substratum;
- Salinity; and
- Acidity or Alkalinity.

It should be noted that where sub-categories exist within the above descriptors, hierarchical systems are employed, and these are thus nested in relation to each other. The HGM unit (Level 4) is the focal point of the system, with the upper levels (Figure 11 – Inland systems only) providing means to classify the broad bio-geographical context for grouping functional wetland units at the HGM level, while the lower levels provide more descriptive detail on the particular wetland type characteristics of a particular HGM unit. Therefore, Level 1 – 5 deals with functional aspects, while Level 6 classifies wetlands on structural aspects.

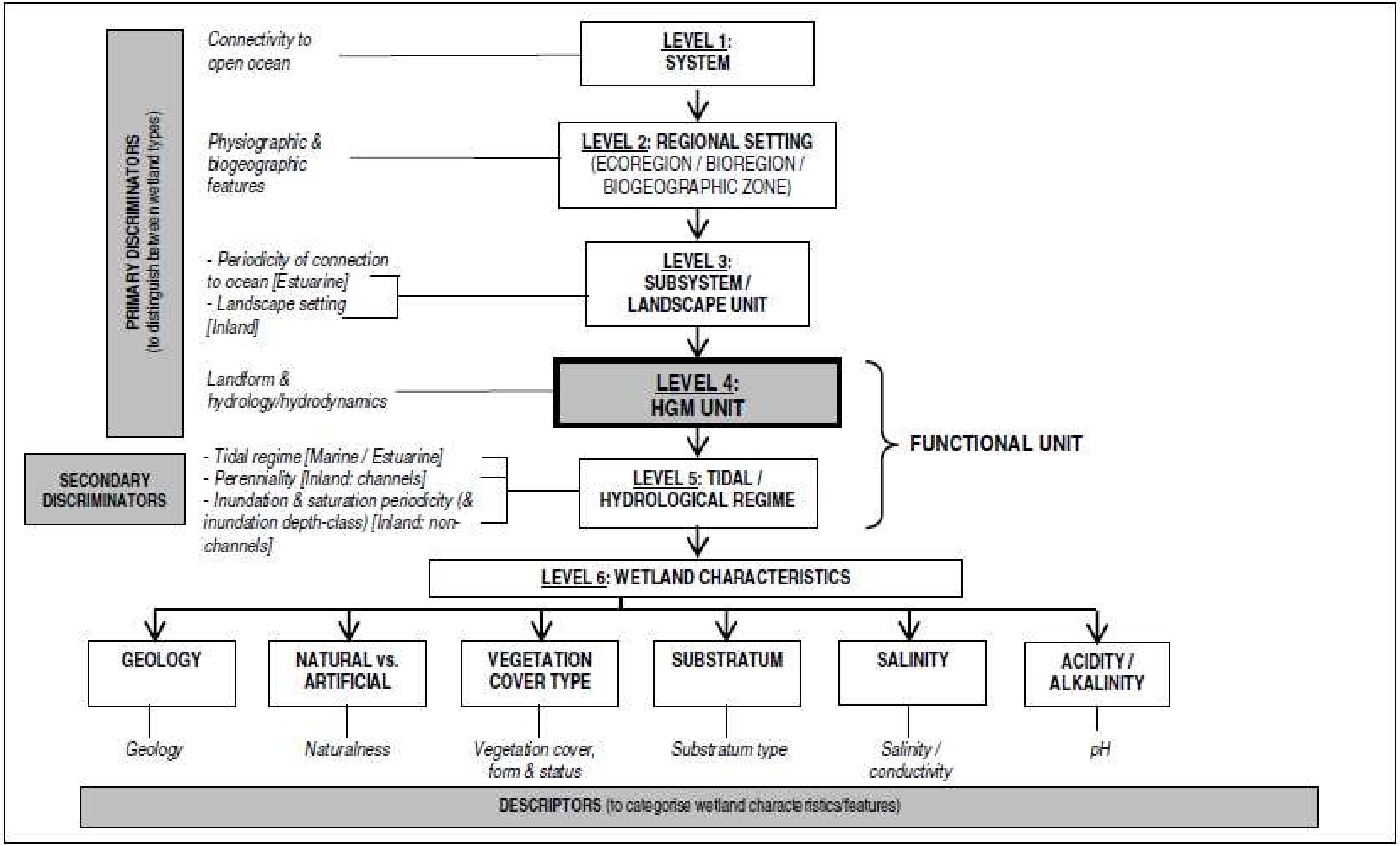

Figure 10: Basic structure of the NWCS, showing how 'primary discriminators' are applied up to Level 4 to classify Hydrogeomorphic (HGM) Units, with 'secondary discriminators' applied at Level 5 to classify the tidal/hydrological regime, and 'descriptors' applied

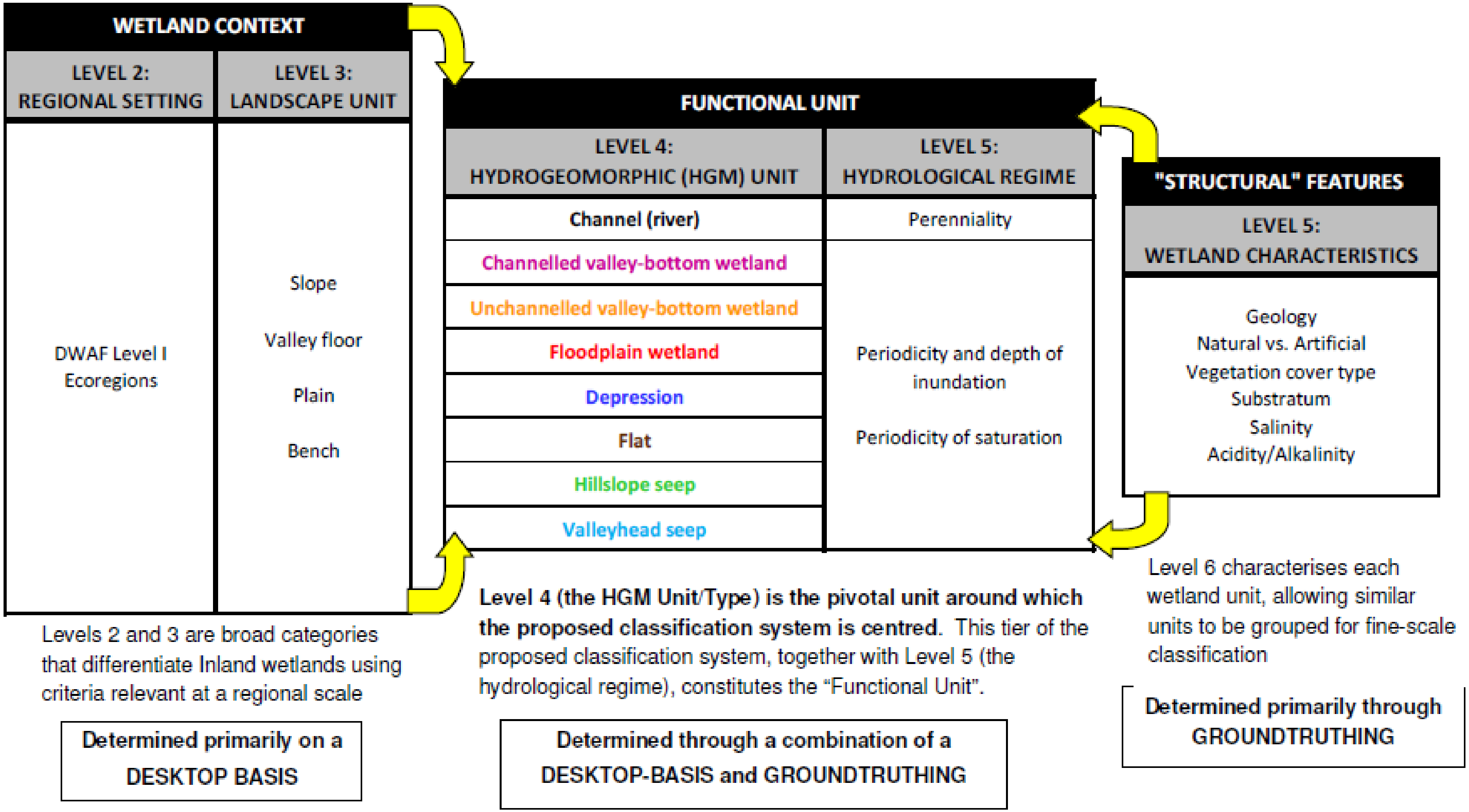

Figure 11: Illustration of the conceptual relationship of HGM Units (at Level 4) with higher and lower levels (relative sizes of the boxes show the increasing spatial resolution and level of detail from the higher to the lower levels) for Inland Systems (from Ollis *et al.*, 2013)

8.4 Determining the ecological integrity of wetlands

The Wetland Index of Habitat Integrity (WETLAND-IHI) is a tool developed for use in the National Aquatic Ecosystem Health Monitoring Programme (NAEHMP), formerly known as the River Health Programme (RHP). The output scores from the WETLAND-IHI model are presented in the standard DWAF A-F ecological categories (Table 1)

Table 1: Description of A – F ecological categories based on Kleynhans et al. (2005)

<table>
<tr><th>ECOLOGICAL CATEGORY</th><th>ECOLOGICAL DESCRIPTION</th><th>MANAGEMENT PERSPECTIVE</th></tr>
<tr><td>A</td><td>Unmodified, natural.</td><td>Protected systems; relatively untouched by human hands; no discharges or impoundments allowed</td></tr>
<tr><td>B</td><td>Largely natural with few modifications. A small change in natural habitats and biota may have taken place, but the ecosystem functions are essentially unchanged.</td><td>Some human-related disturbance, but mostly of low impact potential</td></tr>
<tr><td>C</td><td>Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.</td><td rowspan="2">Multiple disturbances associated with the need for socio-economic development, e.g., impoundment, habitat modification, and water quality degradation</td></tr>
<tr><td>D</td><td>Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.</td></tr>
<tr><td>E</td><td>Seriously modified. The loss of natural habitat, biota, and basic ecosystem functions is extensive.</td><td rowspan="2">Often characterized by high human densities or extensive resource exploitation. Management intervention is needed to improve health, e.g., to restore flow patterns, river habitats, or water quality</td></tr>
<tr><td>F</td><td>Critically / Extremely modified. Modifications have reached a critical level, and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances, the basic ecosystem functions have been destroyed, and the changes are irreversible.</td></tr>
</table>

The WETLAND-IHI model is composed of four modules. The “Hydrology”, “Geomorphology”, and “Water Quality” modules all assess the contemporary driving processes behind wetland formation and maintenance. The last module, “Vegetation Alteration”, provides an indication of the intensity of human land use activities on the wetland surface itself and how these may have modified the condition of the wetland. The integration of the scores from these 4 modules provides an overall PES score for the wetland system being examined. The WETLAND-IHI model is an MS Excel-based model, and the data required for the assessment are generated during a site visit.

Additional data may be obtained from remotely sensed imagery (aerial photos, maps, and/or satellite imagery) to assist with the assessment.

8.5 Determining the Present Ecological State of Wetlands

WET-Health assists in assessing the health of wetlands using indicators based on geomorphology, hydrology, and vegetation. WET-Health is a tool designed to assess the health or integrity of a wetland. Wetland health is defined as a measure of the deviation of wetland structure and function from the wetland's natural reference condition. This technique attempts to assess hydrological, geomorphological, and vegetation health in three separate modules.

- **Hydrology** is defined in this context as the distribution and movement of water through a wetland and its soils. This module focuses on changes in water inputs as a result of changes in catchment activities and characteristics that affect water supply and its timing, as well as on modifications within the wetland that alter the water distribution and retention patterns within the wetland.
- **Geomorphology** is defined in this context as the distribution and retention patterns of sediment within the wetland. This module focuses on evaluating current geomorphic health through the presence of indicators of excessive sediment inputs and/or losses for clastic (minerogenic) and organic sediment (peat).
- **Vegetation** is defined in this context as the vegetation's structural and compositional state. This module evaluates changes in vegetation composition and structure as a consequence of current and historic onsite transformation and/or disturbance.

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present State score. The tool attempts to standardise the way that impacts are calculated and presented across each of the modules. This takes the form of assessing the spatial extent of impact of individual activities and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact.

Impact scores obtained for each of the modules reflect the degree of change from natural reference conditions. Resultant health scores fall into one of six health categories (A-F) on a gradient from "unmodified/natural" (Category A) to "severe/complete deviation from natural" (Category F) as depicted in Table 2, below. This classification is consistent with DWAF categories used to evaluate the present ecological state of aquatic systems.

An overall wetland health score was calculated by weighting the scores obtained for each module and combining them to give an overall combined score using the following formula:

Overall health rating = [(Hydrology*3) + (Geomorphology*2) + (Vegetation*2)] / 7

This overall score assists in providing an overall indication of wetland health/functionality, which can, in turn, be used for recommending appropriate management measures.

Table 2: Health categories used by WET-Health for describing the integrity of wetlands (after Macfarlane *et al*., 2008).

IMPACT CATEGORY	DESCRIPTION	RANGE	PES
None	Unmodified, natural.	0 – 0.9	**A**
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible, and a small loss of natural habitats and biota may have taken place.	1 – 1.9	**B**
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact	2 – 3.9	**C**
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4 – 5.9	**D**
Serious	The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6 – 7.9	**E**
Critical	Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 – 10	**F**

8.6 Determining the Ecological Importance and Sensitivity of Wetlands

South Africa is a Contracting Party to the Ramsar Convention on Wetlands, signed in Ramsar, Iran, in 1971, and has thus committed itself to this intergovernmental treaty, which provides the framework for the national protection of wetlands and the resources they provide. Wetland conservation is now driven by the South African National Biodiversity Institute, a requirement under the National Environmental Management: Biodiversity Act (No 10 of 2004).

Wetlands are among the most valuable and productive ecosystems on earth, providing important opportunities for sustainable development (Davies and Day, 1998). However, wetlands in South Africa are still rapidly being lost or degraded through direct human-induced pressures (Nel et al., 2004).
The most common attributes or goods and services provided by wetlands include:

- Improve water quality;
- Impede flow and reduce the occurrence of floods;
- Reeds and sedges used in construction and traditional crafts;
- Bulbs and tubers, a source of food and natural medicine;
- Store water and maintain base flow of rivers;
- Trap sediments; and
- Reduce the number of water-borne diseases.

In terms of this study, the wetlands provide ecological (environmental) value to the area, acting as refugia for various wetland-associated plants, butterflies, and birds. In the past, wetland conservation has focused on biodiversity as a means of substantiating the protection of wetland habitat. However, not all wetlands provide such motivation for their protection, wetland managers and conservationists began assessing the importance of wetland function within an ecosystem.

WET-EcoServices is used to assess the goods and services that individual wetlands provide, thereby aiding informed planning and decision making. It is designed for a class of wetlands known as palustrine wetlands (i.e., marshes, floodplains, vleis or seeps). The tool provides guidelines for scoring the importance of a wetland in delivering each of 15 different ecosystem services (including flood attenuation, sediment trapping, and provision of livestock grazing). The first step is to characterise wetlands according to their hydro-geomorphic setting (e.g. floodplain). Ecosystem service delivery is then assessed either at Level 1, based on existing knowledge, or at Level 2, based on a field assessment of key descriptors (e.g., flow pattern through the wetland). The overall goal of WET-EcoServices is to assist decision makers, government officials, planners, consultants, and educators in undertaking quick assessments of wetlands, specifically in order to reveal the ecosystem services that they supply. This allows for more informed planning and decision-making.

Table 3 below summarises the importance of wetland function when related to ecosystem services or ecoservices (Kotze *et al.,* 2008). One such example is emergent reed bed wetlands that function as transformers converting inorganic nutrients into organic compounds (Mitsch and Gosselink, 2000).

Table 3: Summary of direct and indirect ecoservices provided by wetlands from Kotze et al., 2008

Ecosystem services supplied by wetlands	Indirect benefits	Hydro-geochemical benefits	Flood attenuation	
			Stream flow regulation	
			Water quality enhancement benefits	Sediment trapping
				Phosphate assimilation
				Nitrate assimilation
				Toxicant assimilation
				Erosion control
			Carbon storage	
		Biodiversity maintenance		
	Direct benefits	*Provision of water for human use*		
		Provision of harvestable resources[2]		
		Provision of cultivated foods		
		Cultural significance		
		Tourism and recreation		
		Education and research		

Conservation importance of the individual wetlands was based on the following criteria:
Habitat uniqueness;
Species of conservation concern;
Habitat fragmentation, or rather, continuity or intactness with regard to ecological corridors, and
Ecosystem service (social and ecological).

8.7 Ecological classification and description

The assessment of Ecological Classification was based on the Kleynhans *et al.* 2005 approach. Therefore the presence of any or a combination of the above criteria would result in a HIGH conservation rating if the wetland was found in a near-natural state (high PES). Should any of the habitats be found modified, the conservation importance would be rated as MEDIUM, unless a Species of Conservation Concern (SCC) was observed, in which case it would receive a HIGH rating. Any system that was highly modified (low PES) or had none of the above criteria received a LOW conservation importance rating. Wetlands with HIGH and MEDIUM ratings should thus be excluded from development with incorporation into a suitable open space system, with the maximum possible buffer being applied. Natural wetlands or Wetlands that resemble some form of the past landscape but receive a LOW conservation importance rating could be included into stormwater management features and should not be developed to retain the function of any ecological corridors. These values were also compared to the DWS (2014) PES / EIS assessment for the greater catchments.

9 Results

9.1 Wetland delineation

Following the contextualisation of the study area with the available desktop data, site visits were conducted (April 2022 and a follow-up visit in October 2022 (early Spring) and May 2025 (Autumn) to groundtruth the findings and confirm the delineation of the aquatic habitat, and then map the associated 500m and 100m Regulated Area where relevant. Subsequent screening provided an indication of which of these systems may potentially be impacted by the project. There are a number of factors that influence the level of impact, such as the type of system, the position of the system in relation to the project, and the location of the system in the landscape.

9.2 Wetland unit identification

In order to identify the wetland types, using Kotze *et al.* (2009) and Ollis *et al*. (2013), a characterisation of hydrogeomorphic (HGM) types was conducted. For reference purposes, the freshwater HGM units were Watercourse 1, Watercourse 2, Stormwater drainage, Transformed Pan, Pan 2 and Pan 3 (Plate 1 & 2).

Water inputs for these systems are naturally dominated by surface water flows only. Groundwater inflow, which would follow the subsurface flows, would be limited due to the local geology (semi-permeable rock, with limited topsoil and subsoil) and topography. With regard to the watercourses/drainage lines, no clear aquatic features, instream aquatic vegetation units within the site was observed. Thus, no direct impacts are expected within this area.

9.3 Wetland Unit Setting

Regional Setting (Level 2): Identifies broad ecoregions associated with the observed systems and in the case of the observed systems, these are associated with riverine / wetland systems of the Southern Coastal Belt Ecoregion, i.e. small short coastal catchments, usually with steep ravines or valleys separated by flat benches (Landscape Unit - Level 3). These bench area also therefore contain pans/depressions.

Plate 1: A view of the only natural aquatic feature, namely the Pans, located beyond the site

Plate 2: *Typha capensis* / reedbed wetland associated with runoff from the site near a concrete culvert

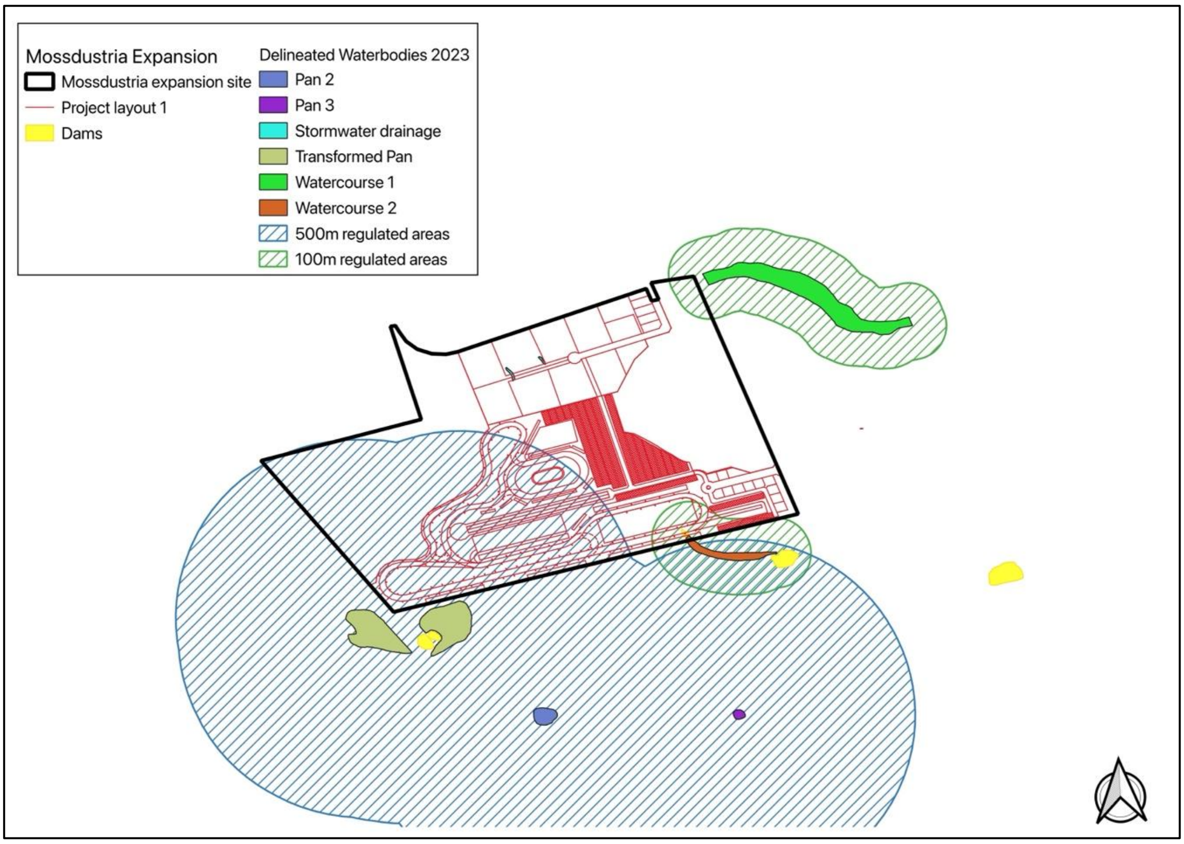

Figure 12: The aquatic features present within the study area and the respective regulated zones

Based then on the field observations the site was therefore found to include three natural aquatic features associated with catchments and rivers, characterised as follows:

1. Minor Ephemeral watercourses - without instream or obligate riparian vegetation (Plate 1). These range from narrow channels along the flat plateaus to steep riverine valley areas beyond the stie.

2. Some of the above riverine areas contained sedge dominated wetlands, associates with the Tweekuilen system, but have been included into the No-Go areas associated with the alluvial systems delineated in this report (Plate 1).

3. Small isolated or endorheic depressions (Plate 2)

4. Artificial Dams and weirs / berms were also observed but would not have any impact on the proposed layout, as some of the larger waterbodies were surrounded by wetland features and would thus be excluded from the development footprint.

From a species point of view, the riverine feature are typically dominated by *Vachellia karroo, Searsia lancea, Euclea undulata, Gymonsporia buxifolia*, but these were largely absent from the preferred layout footprint. While species within the lower portions of the Brak River, within the riverine wetlands were dominated by sedges such as *Juncus spp, Scirpoides spp*, and *Ficinia littoralis* shown.

The study area is however, however, not located within an International Bird Area (IBA) or a Strategic Water Resource Area and did not contain any Wetland Clusters. No listed aquatic listed plant species were observed during the survey, but several of the observed amphibian species are protected.

Both *Amietia fuscigula* (Cape River Frog) and *Amietia poyntoni* (Poyntons River Frog), two frog species, were observed in the lower Tweekuilen River in an earlier survey, noting that although these are both listed as Least Concern, while *Amietia poyntoni* is considered a regional endemic (Source https://freshwaterbiodiversity.org/map/#site-detail/taxon=&search=&siteId=85744).

9.4 Wetland soils

As no wetlands were located within the site, and those present were located on private land adjacent the site, no cores were taken, but based on the types of systems observed (pans and rivers), these would not impact on the accuracy of the delineations. The observed pans are located on neighbouring farms / land owners properties and could thus not be accessed or deemed necessary during the surveys. However a concerted effort was made within the site to inspect any possible any areas with aquatic vegetation. Soils within the site contained no wetland soil indicators especially within the reedbed areas as these were contained with disturbed or hard engineered areas near a culvert. i.e. temporal / ephemeral areas adjacent the wetland could not be found and thus constrained within these areas by the erosion protection features.

9.5 Description of wetland type

All of the identified systems were classified as shown in Tables 4, where all system are Inland freshwater wetland types, located within a coastal plain, ranging from modified or transformed to artificial, either through habitat fragmentation or physical disturbance.

9.6 General functional description of wetland / aquatic unit types

The observed systems are surface water accumulations with no to limited distinct watercourse/channels, with limited instream or emergent areas. The pans are surrounded by terrestrial fynbos species and are dominated by plant species such as *Metalasia densa, Passerina corymbose, Searsia lucida, Anthospermum aethiopicum, Dicerothamnus rhinocerotis, Erica hispidula, Helichrysum cymosum, Phylica axillaris, Selago corymbose, Pteridium aquilinum, Eriospermum vermiforme, Crassula orbicularis, Aristida junciformis subsp. Galpinii, Brachiaria serrata, Cymbopogon marginatus, Elegia juncea, Eragrostis capensis, Ischyrolepis gaudichaudiana, Restio triticeus,* and *Themeda triandra.*

The reed bed systems in the stormwater channels have then developed into almost monospecific reedbed (*Phragmites australis*) / bullrush (*Typha capensis*) dominated systems. Species that typically indicate altered flows or high nutrient inputs.

9.7 Wetland / aquatic ecological functional assessment

No endemic or conservation-worthy aquatic species (Listed or Protected) were observed or have been recorded. Further as the site is disconnected from any functional wetland or watercourse units, with limited to no runoff being generated by the site, this assessment was not carried out in great detail. However as the proposed project will generate runoff in concentrated areas, this is assessed in more detail in the impact section for the operational phase in particular.

9.8 The ecological health assessment of the project area

The Present Ecological State (PES) of a river, watercourse, or wetland represents the extent to which it has changed from the reference or near-pristine condition (Category A) towards a highly impacted system where there has been an extensive loss of natural habitat and biota, as well as ecosystem functioning (Category E).

The PES scores have been revised for the country and are based on the updated models, which include aspects of functional importance as well as direct and indirect impacts (DWS, 2014). The updated PES system also incorporates Ecological Importance (EI) and Ecological Sensitivity (ES) separately as opposed to Ecological Importance and Sensitivity (EIS) in the previous model, although the revised model is still heavily centred on rating rivers using broad fish, invertebrate, riparian vegetation, and water quality indicators. The Recommended Ecological Category (REC) is still contained within the new models, with the default REC being B, when little or no information is available to assess the system or when only one of the parameters is assessed, or the overall PES is rated between a C or D.

9.9 The PES assessment of the remaining freshwater wetland areas

While the National Freshwater Ecosystems Priority Areas (NFEPA) (Nel *et al*., 2011), also earmarked sub-quaternaries, based either on the presence of important biota (e.g. rare or endemic fish species) or conversely the degree of riverine degradation, i.e. the greater the catchment degradation the lower the priority to conserve the catchment. The important catchment areas are then classified as Freshwater Ecosystems Priority Areas (FEPAs).

The survey area falls within FEPAs associated with the several localised coastal river systems, such as the observed Tweekuilen river associated with the study area (Figure 12). It is highly likely that permanent fish habitat occurs outside the study area, and the affected catchments are also then important for the provision and maintenance of flows within the lower catchments, that then support not only fish but also bird, amphibian, and invertebrate habitats.

The Present Ecological State scores (PES) for the main watercourses in the study area were rated as follows (DWS, 2014 – where D = Largely Modified):

Subquaternary Catchment Number	Present Ecological State	Ecological Importance	Ecological Sensitivity
9292	D	Moderate	High

These scores were largely substantiated by observations made in the field within the affected reaches of the systems beyond the study area and was further substantiated the presence of the adjoining Critical Biodiversity Areas (CBA) (Figure 6).

Based on the information collected during the field investigations, these ratings are verified and upheld for the riverine systems. The Moderate and High Ecological Sensitivity rating for the natural water sources, is further substantiated by the fact that the affected catchments retain function, but contain little in terms of obligate instream and emergent vegetation, coupled to the state . degradation of surrounding catchments.

Overall, these catchment areas and subsequent rivers / watercourses are largely in a natural state with localised impacts in some areas, which include the following:

- Grazing and farming
- Alien invasive trees / plants
- Impeded water flow due catchment / hydrological fragmentation

Any activities within the observed aquatic systems, the 100 m regulated zone of the rivers and drainage lines or 500 m from the boundary of the wetlands will require a Section 21 c and i Water Use License (mostly likely a General Authorisation (GA) if all other Section 21 uses are below the GA thresholds – however as sewers will be require this then may not be the case). See Figure 12.

The following summary represents the PES/EIS score of the natural wetlands found within or adjacent to the development area (Table 4) and summarised in Figure 13 with regard overall sensitivity noting any dams were rated as Low

Table 4: PES / EIS summary of the respective units

Feature number	Hydrogeomorphic Type	Present Ecological Sate	Ecological Importance and Sensitivity	Overall Sensitivity	Buffer as per Macfarlane & Bredin (2017) Model (m)
Pan 2	Pan / Depression	D	Moderate	Moderate	Not applicable as these are beyond the site or fragmented in such a way that no direct impacts are expected
Pan 3	Pan / Depression	D	Moderate	Moderate	
Transformed Pan	Pan / Depression	D	Moderate	Moderate	
Watercourse 1	Riverine	D	Moderate	Moderate	
Watercourse 2	Riverine	D	Moderate	Moderate	

Wetland PES Results

	Wetland PES Summary			
Wetland name	Pans 2. 3 Transformed			
Assessment Unit	Pans			
Wetland area (Ha)	0.001 Ha			
PES Assessment	HYDROLOGY	GEOMORPHOLOGY	WATER QUALITY	VEGETATION
Impact Score	3,0	5,0	4,0	5,0
PES Score (%)	70%	50%	60%	50%
Ecological Category	C	D	D	D
Combined Impact Score	4,1			
Combined PES Score (%)	59%			
Combined Ecological Category	D			
Hectare Equivalents	0.0011			
Confidence	HIGH based on infield verification			

Watercourse PES Results

SQ REACH DESCRIPTION	SQ REACH	K10A-09292	
	SQR NAME	0,0	
	PES CATEGORY BASED ON MEDIAN OF METRICS	D	
	PES CATEGORY DESCRIPTION	LARGELY MODIFIED	
PES METRIC RATINGS & ADDITIONAL INFO	METRIC	RATING	CONFIDENCE
	INSTREAM HABITAT CONTINUITY MOD	MODERATE	5,0
	RIP/WETLAND ZONE CONTINUITY MOD	LARGE	5,0
	POTENTIAL INSTREAM HABITAT MOD ACT.	MODERATE	5,0
	RIPARIAN-WETLAND ZONE MOD	LARGE	5,0
	POTENTIAL FLOW MOD ACT.	SERIOUS	5,0
	POTENTIAL PHYSICO-CHEMICAL MOD ACTIVITIES	LARGE	5,0
	PES BEST METRIC RATING	2,0	
	PES WORST METRIC RATING	4,0	
	PES OVERALL AVERAGE CONFIDENCE	4,3	
	PES OVERALL COMMENT	No flow on 10.2.12. Longitudinal wetland. Mainly sand and mud substrate. Banks articifical in places, poorly vegetated (removal). In other places well vegetated. Extensive infilling and channelisation to create fields. Impacts: Infilling, removal of rip veg, silos upstream, grazing and trampling.	
FREQUENCY OF RATINGS (%)	% FREQ 0 (NONE)	0,0	
	% FREQ 1 (SMALL)	0,0	
	% FREQ 2 (MODERATE)	33,3	
	% FREQ 3 (LARGE)	50,0	
	% FREQ 4 (SERIOUS)	16,7	
	% FREQ 5 (CRITICAL)	0,0	

9.10 The EIS assessment of the remaining freshwater wetland areas

A WET-Ecoservices (Version 2) field-based assessment was undertaken to assess the ecosystem services supplied by the freshwater wetland (Kotze *et al.* 2020). The assessment technique has recently been revised and now distinguishes clearly both the supply of ecosystem services and the demand for all ecosystem services. This helps determine the potential of the wetland for delivering ecosystem services by understanding its capacity to produce a service while also considering the societal demand for that service.

The assessment showed the wetland in the study area acts as an attenuator, with a low degree of flow filtration, i.e., being riverine through flow rates are higher than a valley bottom system (Table 5).

The assessment showed that both wetlands in the study area act as attenuators, with a low degree of flow filtration as these have little to no direct connection with seasonal flows due to either form (depression) (Table 5).

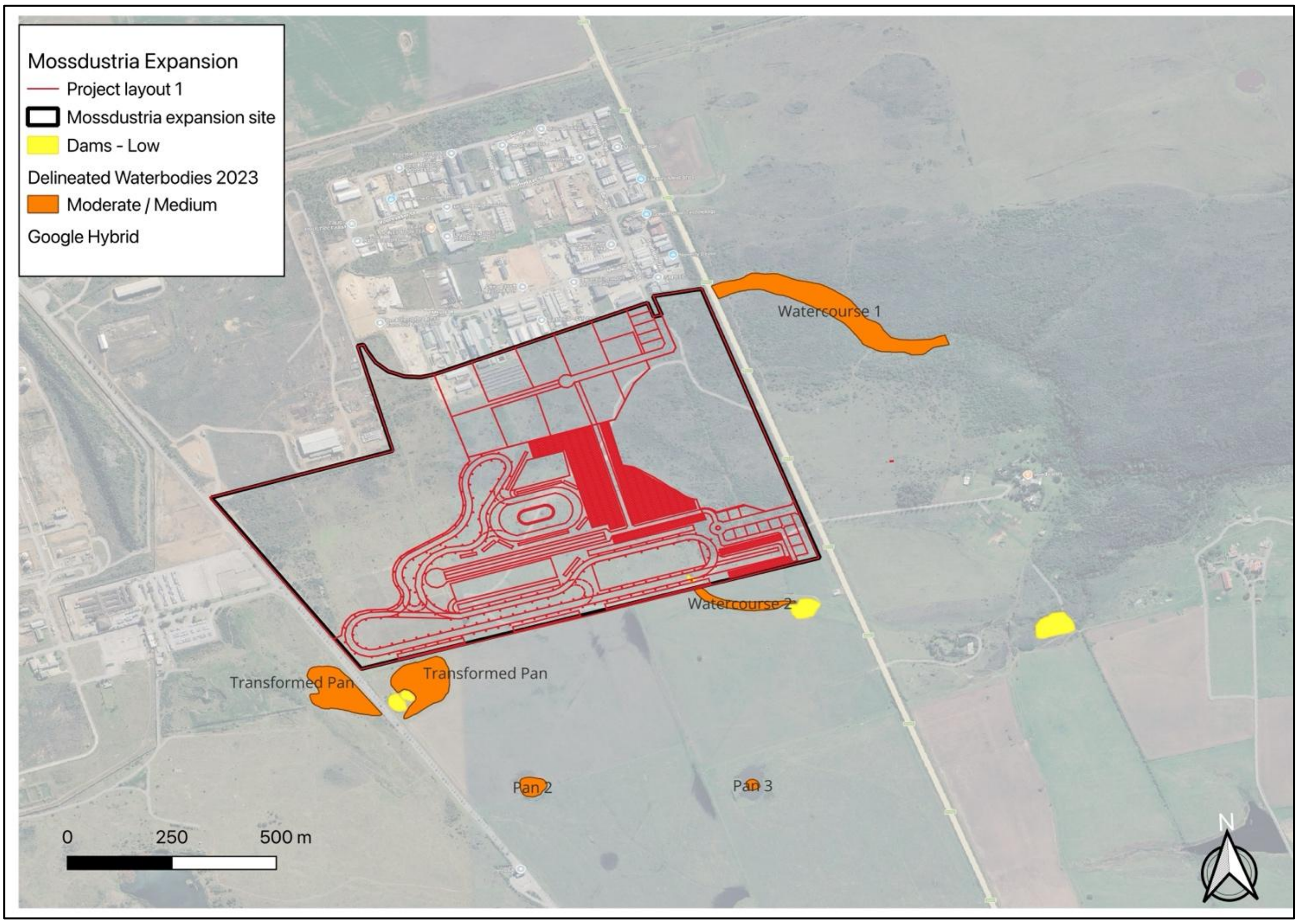

Figure 13: Overall aquatic sensitivity in relation to the proposal layout

Table 5: Results of WET-Ecoservices assessment for Pans 2, Pan 3 and Transformed Pan

Present State					
ECOSYSTEM SERVICE		Supply	Demand	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	0.0	0.0	0.0	Very Low
	Stream flow regulation	0.0	0.0	0.0	Very Low
	Sediment trapping	0.0	0.0	0.0	Very Low
	Erosion control	0.0	0.0	0.0	Very Low
	Phosphate assimilation	0.0	0.0	0.0	Very Low
	Nitrate assimilation	0.0	0.0	0.0	Very Low
	Toxicant assimilation	0.0	0.0	0.0	Very Low
	Carbon storage	0.0	0.0	0.0	Very Low
	Biodiversity maintenance	0.0	0.0	0.0	Very Low
PROVISIONING SERVICES	Water for human use	0.0	0.0	0.0	Very Low
	Harvestable resources	0.0	0.0	0.0	Very Low
	Food for livestock	0.6	0.6	0.6	Very Low
	Cultivated foods	0.0	0.0	0.0	Very Low
CULTURAL SERVICES	Tourism and Recreation	0.0	0.0	0.0	Very Low
	Education and Research	0.0	0.0	0.0	Very Low
	Cultural and Spiritual	0.0	0.0	0.0	Very Low

10 Impact assessment discussions

10.1 Impact 1: Habitat fragmentation (aquatic) – direct construction and operational phase

<table>
<tr><td colspan="2">Environmental Impact:
Based on the information collected during the assessment, that contained and substantiated by national databases, it is unlikely any impact will occur within the aquatic environment</td><td colspan="2">Activity/Aspect & Impact Source:
Due to the nature of the project this will persist in the long term into the operational phase impact. The past disturbance and avoidance of any aquatic environment that has already occurred would not be exacerbated during the proposed activities</td><td colspan="4">Proposed Mitigation:
All alien cover must be removed and then be allowed to fully recover and revegetate with climax fynbos species. These areas should remain free form alien plants and be monitored for any erosion. Where soils are slow to revegetate, these areas should be grubbed and planted with species suited to the region.
In adhering to the above, habitat fragmentation within, and more importantly the connection with intact habitats still surrounding the site, will be promoted, assuming that the areas around the site will remain undeveloped in the near future. i.e. integrated into regional conservation plans for the municipality.</td></tr>
<tr><td colspan="8">Impact Significance</td></tr>
<tr><td rowspan="2">Without Mitigation:</td><td>Extent</td><td>Duration</td><td>Severity</td><td>Reversibility</td><td>Irreplaceable Loss</td><td>Probability</td><td>Impact Significance</td></tr>
<tr><td>Site (1)</td><td>Long-term (4)</td><td>Moderate (4)</td><td>Completely (0)</td><td>Partly (0.5)</td><td>Definite (5)</td><td>Moderate (47.5)</td></tr>
<tr><td rowspan="2">With Mitigation:</td><td>Extent</td><td>Duration</td><td>Severity</td><td>Reversibility</td><td>Irreplaceable Loss</td><td>Probability</td><td>Impact Significance</td></tr>
<tr><td>Site (1)</td><td>Long-term (4)</td><td>Minor (2)</td><td>Completely (0)</td><td>Partly (0.5)</td><td>Probable (3)</td><td>Low (22.5)</td></tr>
<tr><td colspan="4">Potential to Mitigate:
Moderate potential / easy to mitigate</td><td colspan="4">Assessment Confidence:
Complete</td></tr>
</table>

10.2 Impact 2: Impact on surface water runoff patterns – direct operational impact

The clearing of dense vegetation that will be replaced with hard surfaces has the ability to increase run-off due to reduced vegetation cover / change in vegetation cover. By intercepting and slowing precipitation hitting the ground, vegetation substantially reduces the volume and rate of runoff. This then prevents soil erosion.	***Activity/Aspect & Impact Source:*** Due to the nature of the project this will persist in the long term in the operational phase impact.	***Proposed Mitigation:*** • No run-off should be allowed to leave the site directly. Any flows should be contained using the detention ponds as part of a stormwater management plan, especially if any runoff may contain any hydrocarbons that may be generated by the raceway.

Impact Significance							
	Extent	**Duration**	**Severity**	**Reversibility**	**Irreplaceable Loss**	**Probability**	**Impact Significance**
Without Mitigation:	Site (1)	Long-term (4)	Moderate (4)	Completely (0)	Partly (0.5)	Definite (5)	Moderate (47.5)
	Extent	**Duration**	**Severity**	**Reversibility**	**Irreplaceable Loss**	**Probability**	**Impact Significance**
With Mitigation:	Site (1)	Long-term (4)	Minor (2)	Completely (0)	Partly (0.5)	Probable (3)	Low (22.5)
Potential to Mitigate: Moderate potential / easy to mitigate				***Assessment Confidence:*** Complete			

10.3 Impact 3: Increase in sedimentation and erosion – direct operational phase

Environmental Impact: increase amount of siltation in downstream areas when increased volumes of water are generated by the site.	***Activity/Aspect & Impact Source:*** Due to the nature of the project this will persist in the long term in the operational phase impact.	***Proposed Mitigation:*** • Suitable stormwater management must be included such as the stormwater detention ponds. This will trap sediment, coupled to revegetation of bare soil areas with local plant species.

Impact Significance							
	Extent	**Duration**	**Severity**	**Reversibility**	**Irreplaceable Loss**	**Probability**	**Impact Significance**
Without Mitigation:	Site (1)	Long-term (4)	Moderate (4)	Completely (0)	Partly (0.5)	Definite (5)	Moderate (47.5)
	Extent	**Duration**	**Severity**	**Reversibility**	**Irreplaceable Loss**	**Probability**	**Impact Significance**
With Mitigation:	Site (1)	Long-term (4)	Minor (2)	Completely (0)	Partly (0.5)	Probable (3)	Low (22.5)
Potential to Mitigate: Moderate potential / easy to mitigate				***Assessment Confidence:*** Complete			

10.4 Impact 4: Risks on the aquatic environment due to water quality impacts – indirect construction phase

<table>
<tr><td>Environmental Impact:
This impact is mostly related to use of substances such as cement, oils and hydrocarbons during the construction process and, to a limited degree, solid waste.</td><td colspan="3">Activity/Aspect & Impact Source:
Due to the nature of the project this will persist in the short term in the construction phase.</td><td colspan="4">Proposed Mitigation:
Due care to prevent accidental leakage of pollutants (e.g. oil, fuel, cement), must be an utmost priority during the construction phase and operational phases of the raceway in particular
Proper solid waste disposal (e.g. bins, no littering or burning policy and the maintenance of ablution facilities, including the disposal of liquid and hazardous waste at a licensed waste disposal site must be adhered to by the contractors.
No re-fuelling of construction vehicles or maintenance activities to occur proximate to the watercourse near the site.</td></tr>
<tr><td colspan="8">Impact Significance</td></tr>
<tr><td rowspan="2">Without Mitigation:</td><td>Extent</td><td>Duration</td><td>Severity</td><td>Reversibility</td><td>Irreplaceable Loss</td><td>Probability</td><td>Impact Significance</td></tr>
<tr><td>Site (1)</td><td>Long-term (4)</td><td>Moderate (4)</td><td>Completely (0)</td><td>Partly (0.5)</td><td>Definite (5)</td><td>Moderate (47.5)</td></tr>
<tr><td rowspan="2">With Mitigation:</td><td>Extent</td><td>Duration</td><td>Severity</td><td>Reversibility</td><td>Irreplaceable Loss</td><td>Probability</td><td>Impact Significance</td></tr>
<tr><td>Site (1)</td><td>Long-term (4)</td><td>Minor (2)</td><td>Completely (0)</td><td>Partly (0.5)</td><td>Probable (3)</td><td>Low (22.5)</td></tr>
<tr><td colspan="4">Potential to Mitigate:
Moderate potential / easy to mitigate</td><td colspan="4">Assessment Confidence:
Complete</td></tr>
</table>

10.5 Impact 5: Cumulative impacts

<table>
<tr><td>Environmental Impact:
The cumulative impacts are related to the loss of any aquatic habitats</td><td colspan="3">Activity/Aspect & Impact Source:
Due to the nature of the project this will persist in the long term in the operational phase impact. However, this is only related to terrestrial environments assessed separately and not the aquatic environment.</td><td colspan="4">Proposed Mitigation:
Ideally all areas rated as HIGH should be excluded from the Construction must be limited to the footprint only to minimise secondary disturbance, thus reducing the size of the areas that require revegetation, to a minimum.</td></tr>
<tr><td colspan="8">Impact Significance</td></tr>
<tr><td rowspan="2">Without Mitigation:</td><td>Extent</td><td>Duration</td><td>Severity</td><td>Reversibility</td><td>Irreplaceable Loss</td><td>Probability</td><td>Impact Significance</td></tr>
<tr><td>Site (1)</td><td>Long-term (4)</td><td>Moderate (4)</td><td>Completely (0)</td><td>Partly (0.5)</td><td>Definite (5)</td><td>Moderate (47.5)</td></tr>
<tr><td rowspan="2">With Mitigation:</td><td>Extent</td><td>Duration</td><td>Severity</td><td>Reversibility</td><td>Irreplaceable Loss</td><td>Probability</td><td>Impact Significance</td></tr>
<tr><td>Site (1)</td><td>Long-term (4)</td><td>Minor (2)</td><td>Completely (0)</td><td>Partly (0.5)</td><td>Probable (3)</td><td>Low (22.5)</td></tr>
</table>

Potential to Mitigate: Moderate potential / easy to mitigate	**_Assessment Confidence:_** Complete

11 Aquatic buffer zone

An aquatic impact buffer zone is defined as a zone of vegetated land designed and managed so that sediment and pollutant transport carried from source areas via diffuse surface runoff is reduced to acceptable levels (Macfarlane & Bredin, 2017). Aquatic buffer zones are designed to act as barriers between human activities and sensitive water resources in order to protect them from adverse negative impacts. Buffer zones associated with water resources have been shown to perform a wide range of functions and have therefore been adopted as a standard measure to protect water resources and associated biodiversity.

Currently, there are no formalised riverine or wetland buffer distances provided by the provincial authorities, and as such, the buffer model as described by Macfarlane & Bredin (2017) for wetlands, rivers, and estuaries was used.

However, as works will take place outside of any delineated natural systems, that are located beyond the site boundary, no buffer is required.

12 Conclusions and Recommendations

Based on this assessment, all the impacts with mitigation will be LOW, and the report author has no objection to the authorisation of this project relating to the proposed layout, assuming all recommendations and mitigations are implemented. This is based on the fact there is limited to no direct connection between the site, the proposed activities and nay natural / functional aquatic systems, in particular wetlands.

As the proposed activities have the potential to create erosion and or water quality related impacts, the following recommendations are reiterated and must be included in the monitoring requirements of the EMPr:

- All construction materials, including fuels and oil, should be stored in demarcated areas that are contained within berms/bunds to avoid the spread of any contamination. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion.
- Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any aquatic features. I
- t is therefore suggested that all construction camps, lay down areas, batching plants, or areas, and any stores should be more than 50m from any demarcated waterbodies.
- Ongoing monitoring of the pipelines for leaks must form part of the maintenance plan, and be conducted at least twice a year

The attached DWS Risk Assessment Matrix (Appendix 2), indicates that based on the proposed layout and mitigations, a potential General Authorisations could be followed based on the Section 21c & i water uses, but this will be confirmed by DWS.

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14 Appendix 1 CV

CURRICULUM VITAE

Dr Brian Michael Colloty
7212215031083
1 Rossini Rd
Pari Park
Gqeberha, 6070
brianc@envirosci.co.za
083 498 3299

Profession: Ecologist & Environmental Assessment Practitioner (Pr. Sci. Nat. 400268/07)
Member of the South African Wetland Society
Specialisation: Ecology and conservation importance rating of inland habitats, wetlands, rivers & estuaries
Years experience: 30 years

SKILLS BASE AND CORE COMPETENCIES

- 30 years experience in environmental sensitivity and conservation assessment of aquatic and terrestrial systems inclusive of Index of Habitat Integrity (IHI), WET Tools, Riparian Vegetation Response Assessment Index (VEGRAI) for Reserve Determinations, estuarine and wetland delineation throughout Africa. Experience also includes biodiversity and ecological assessments with regard sensitive fauna and flora, within the marine, coastal and inland environments. Countries include Mozambique, Kenya, Namibia, Central African Republic, Zambia, Eritrea, Mauritius, Madagascar, Angola, Ghana, Guinea-Bissau and Sierra Leone. Current projects also span all nine provinces in South Africa.
- 15 years experience in the coordination and management of multi-disciplinary teams, such as specialist teams for small to large scale EIAs and environmental monitoring programmes, throughout Africa and inclusive of marine, coastal and inland systems. This includes project and budget management, specialist team management, client and stakeholder engagement and project reporting.
- GIS mapping and sensitivity analysis

TERTIARY EDUCATION

- 1994: B Sc Degree (Botany & Zoology) - NMU
- 1995: B Sc Hon (Zoology) - NMU
- 1996: M Sc (Botany - Rivers) - NMU
- 2000: Ph D (Botany – Estuaries & Mangroves) – NMU

EMPLOYMENT HISTORY

- 1996 – 2000 Researcher at Nelson Mandela University – SAB institute for Coastal Research & Management. Funded by the WRC to develop estuarine importance rating methods for South African Estuaries
- 2001 – January 2003 Training development officer AVK SA (reason for leaving – sought work back in the environmental field rather than engineering sector)
- February 2003- June 2005 Project manager & Ecologist for Strategic Environmental Focus (Pretoria) – (reason for leaving – sought work related more to experience in the coastal environment)

- July 2005 – June 2009 Principal Environmental Consultant Coastal & Environmental Services (reason for leaving – company restructuring)
- June 2009 – August 2018 Owner / Ecologist of Scherman Colloty & Associates cc
- August 2018 Owner / Ecologist - EnviroSci (Pty) Ltd

SELECTED RELEVANT PROJECT EXPERIENCE

World Bank IFC Standards
- Botswana South Africa 400kv transmission line (400km) biodiversity assessment on behalf of Aurecon - current
- Farim phosphate mine and port development, Guinea Bissau – biodiversity and estuarine assessment on behalf of Knight Piesold Canada – 2016.
- Tema LNG offshore pipeline EIA – marine and estuarine assessment for Quantum Power (2015).
- Colluli Potash South Boulder, Eritrea, SEIA marine baseline and hydrodynamic surveys co-ordinator and coastal vegetation specialist (coastal lagoon and marine) (on-going).
- Wetland, estuarine and riverine assessment for Addax Biofeuls Sierra Leone, Makeni for Coastal & Environmental Services: 2009
- ESHIA Project manager and long-term marine monitoring phase coordinator with regards the dredge works required in Luanda bay, Angola. Monitoring included water quality and biological changes in the bay and at the offshore disposal outfall site, 2005-2011

South Africa
- Plant and animal search and rescue for the Dassiesridge Wind Farm on behalf of EDF Current
- Plant and animal search and rescue for the Karusa and Soetwater Wind Farms on behalf of Enel Green Power, 2021
- Plant and animal search and rescue for the Nxuba, Oyster Bay and Garob Wind Farms on behalf of Enel Green Power, 2018 - 2019
- Plant and Animal Search and Rescue for the Port of Ngqura, Transnet Landside infrastructure Project, with development and management of on site nursery, Current
- Plant and Animal Search and Rescue for the Port of Ngqura, OTGC Tank Farm Project (2019)
- Plant search and rescue, for NMBM (Driftsands sewer, Glen Hurd Drive), Department of Social Development (Military veterans housing, Despatch) and Nxuba Wind Farm, - current
- Wetland specialist appointed to update the Eastern Cape Biodiversity Conservation Plan, for the Province on behalf of EOH CES appointment by SANBI – current. This includes updating the National Wetland Inventory for the province, submitting the new data to CSIR/SANBI.
- CDC IDZ Alien eradication plans for three renewable projects Coega Wind Farm, Sonop Wind Farm and Coega PV, on behalf of JG Afrika (2016 – 2017).
- Nelson Mandela Bay Municipality Baakens River Integrated Wetland Assessment (Inclusive of Rehabilitation and Monitoring Plans) for CEN IEM Unit - Current
- Rangers Biomass Gasification Project (Uitenhage), biodiversity and wetland assessment and wetland rehabilitation / monitoring plans for CEM IEM Unit – 2017
- Gibson Bay Wind Farm implementation of the wetland management plan during the construction and operation of the wind farm (includes surface / groundwater as well wetland rehabilitation & monitoring plan) on behalf of Enel Green Power - 2018
- Gibson Bay Wind Farm 133kV Transmission Line wetland management plan during the construction of the transmission line (includes wetland rehabilitation & monitoring plan) on behalf of Eskom – 2016.
- Tsitsikamma Community Wind Farm implementation of the wetland management plan during

the construction of the wind farm (includes surface / biomonitoring, as well wetland rehabilitation & monitoring plan) on behalf of Cennergi – completed May 2016.

- Alicedale bulk sewer pipeline for Cacadu District, wetland and water quality assessment, 2016
- Mogalakwena 33kv transmission line in the Limpopo Province, on behlaf of Aurecon, 2016
- Cape St Francis WWTW expansion wetland and passive treatment system for the Kouga Municipality, 2015
- Macindane bulk water and sewer pipelines wetland and wetland rehabilitation plan 2015
- Eskom Prieska to Copperton 132kV transmission line aquatic assessment, Northern Cape on behalf of Savannah Environmental 2015.
- Joe Slovo sewer pipeline upgrade wetland assessment for Nelson Mandela Bay Municipality 2014
- Cape Recife Waste Water Treatment Works expansion and pipeline aquatic assessment for Nelson Mandela Bay Municipality 2013
- Pola park bulk sewer line upgrade aquatic assessment for Nelson Mandela Bay Municipality 2013
- Transnet Freight Rail – Swazi Rail Link (Current) wetland and ecological assessment on behalf of Aurecon for the proposed rail upgrade from Ermelo to Richards Bay
- Eskom Transmission wetland and ecological assessment for the proposed transmission line between Pietermaritzburg and Richards Bay on behalf of Aurecon (2012).
- Port Durnford Exarro Sands biodiversity assessment for the proposed mineral sands mine on behalf of Exxaro (2009)
- Fairbreeze Mine Exxaro (Mtunzini) wetland assessment on behalf of Strategic Environmental Services (2007).
- Wetland assessment for Richards Bay Minerals (2013) – Zulti North haul road on behalf of RBM.
- Vegetation assessments on the Great Brak rivers for Department of Water and Sanitation, 2006 and the Gouritz Water Management Area (2014)
- Proposed FibreCo fibre optic cable vegetation assessment along the PE to George, George to Graaf Reinet, PE to Colesburg, and East London to Bloemfontein on behalf of SRK (2013-2015).

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Brian Michael Colloty

Registration Number: 400268/07

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **7 November 2007** Expires **31 March 2027**

President of Council

Chief Executive Officer

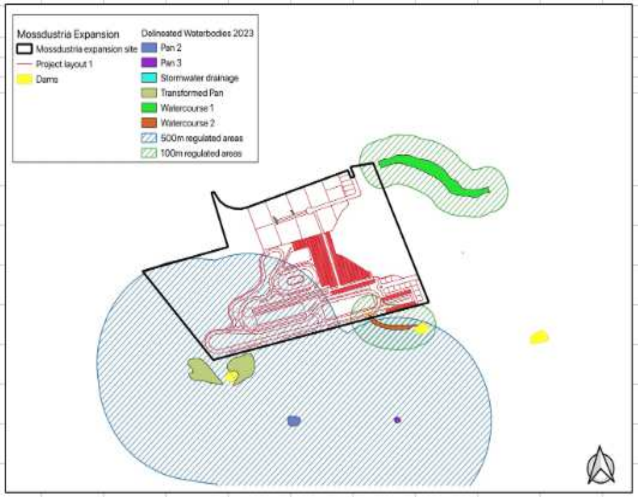
To verify this certificate scan this code

15 Appendix 2: DWS Risk Assessment Matrix

PROJECT: **Mossdustria Expansion - Raceway**

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities (Version 2.1.1)

POTENTIALLY AFFECTED WATERCOURSE/S			FIELD-VERIFIED ASSESSMENT RESULTS				
Watercourse number	**Watercourse name**	**Watercourse type**	**PES**	**EI**	**ES**	**EIS**	**Wetland Importance**
(1)	Wetlands._ Pans 2, 3 and transformed 500m regulated zone only, however there is no hyrdological connection between this site and the wetland catchment due to being a small pan and habitat fragmentation (roads and farmining)	Wetland (incl. pans)	D				Moderate
(2)	Watercourse 1 - cut from from site by road	River / Natural channel	D			Moderate	Not assessed
(3)	Watercourase 2 - cut off from the site by a dam and road	River / Natural channel	D			Moderate	Not assessed
(4)							
(5)							
(6)							
(7)							
(8)							
(9)							
(10)							



DETAILED PROJECT SPECIFICATIONS:
Include detailed project description, including all proposed control measures to prevent/minimise impacts on watercourses

The project entails the extension of Mossdustria and a raceway on the Remainder Portion 8 of Farm Rietvalley 225 (+/- 90 ha). The extension will include the following:
•Industrial development with associated infrastructure (+/- 12 ha);
•Alternative Energy Production Area (+/- 22 ha);
•Conservation area (+/- 15 ha); and
•Motorsport arena including tracks, parking, ablution facilities, training facilities, fuel storage (5 000 litres), 80 workshops, pavilions and associated infrastructure (+/- 38 ha).

Control measures include the establishment of suitbale stormwater management, sewer and bulkwater supply - thus no additional impacts to the surface and ground water of the region is anticupated

PROJECT: Mossdustria Expansion - Raceway

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1.1

Name of Assessor:	Dr Brian Colloty	Signature:
SACNASP Registration Number:	400268/07	
Date of assessment:	20-Jul-26	

Risk to be scored for all relevant phases of the project (**factoring in specified control measures**). MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

Phase	Activity	Impact	Potentially affected watercourses: Name/s	PES	Overall Watercourse Importance	Intensity of Impact on Resource Quality – Abiotic Habitat (Drivers): Hydrology	Water Quality	Geomorph	Biota (Responses): Vegetation	Fauna	Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	Physical Disturbance of Aquatic Systems	Potential impact on wetlands, however works will only take place within the 500m regulated areas	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Changes to local hydrological regimes	Impact as a result of concentrated flows due to stormwater runoff	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Potential impacts on water quality	Increased runoff may result in erosion and downstream sedimentation	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
		Accidental spills such as fuels, oils and or chemicals from construction plant or works areas (concrete & cement)	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
OPERATIONAL	Changes to local hydrological regimes	Impact as a result of concentrated flows due to stormwater runoff	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Potential impacts on water quality	Increased runoff may result in erosion and downstream sedimentation	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
		Accidental spills such as fuels, oils and or chemicals from construction plant or works areas (concrete & cement)	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
DECOMMISSIONING	Physical Disturbance of Aquatic Systems	Potential impact on wetlands, however works will only take place within the 500m regulated areas	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Changes to local hydrological regimes	Impact as a result of concentrated flows due to stormwater runoff	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Potential impacts on water quality	Increased runoff may result in erosion and downstream sedimentation	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
		Accidental spills such as fuels, oils and or chemicals from construction plant or works areas (concrete & cement)	Wetland_Pans	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High

Phase	Activity	Impact	Potentially affected watercourses: Name/s	PES	Overall Watercourse Importance	Intensity of Impact on Resource Quality – Abiotic Habitat (Drivers): Hydrology	Water Quality	Geomorph	Biota (Responses): Vegetation	Fauna	Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	Physical Disturbance of Aquatic Systems	Potential impact on watercourses 1 & 2, however works will only take place within the 100m regulated areas	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Changes to local hydrological regimes	Impact as a result of concentrated flows due to stormwater runoff	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Potential impacts on water quality	Increased runoff may result in erosion and downstream sedimentation	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
		Accidental spills such as fuels, oils and or chemicals from construction plant or works areas (concrete & cement)	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
OPERATIONAL	Changes to local hydrological regimes	Impact as a result of concentrated flows due to stormwater runoff	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Potential impacts on water quality	Increased runoff may result in erosion and downstream sedimentation	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
		Accidental spills such as fuels, oils and or chemicals from construction plant or works areas (concrete & cement)	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
DECOMMISSIONING	Physical Disturbance of Aquatic Systems	Potential impact on watercourses 1 & 2, however works will only take place within the 100m regulated areas	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Changes to local hydrological regimes	Impact as a result of concentrated flows due to stormwater runoff	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
	Potential impacts on water quality	Increased runoff may result in erosion and downstream sedimentation	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High
		Accidental spills such as fuels, oils and or chemicals from construction plant or works areas (concrete & cement)	All	D	Moderate	0	0	0	0	0	0	1	1	2	3	6	20%	1,2	L	High